

Kiyoshi YAMAGUCHI et al., S.N. 10/555,041
Page 7

Dkt. 2271/75406

REMARKS

The application has been reviewed in light of the Office Action dated August 14, 2008. Claims 1, 11, 12 and 14 were pending, with claims 2-10 and 13 having previously been canceled, without prejudice or disclaimer. By this Amendment, new claims 15-24 have been added. Accordingly, claims 1, 11, 12 and 14-24 would be pending upon entry of this Amendment, with claims 1, 11 and 12 being in independent form.

Claims 1, 11 and 12 were rejected under 35 U.S.C. §103(a) as purportedly unpatentable over Eguchi (US 2003/0067513 A1) in view of Takahashi (US 2001/0052627 A1). Claim 14 was rejected under 35 U.S.C. §103(a) as purportedly unpatentable over Eguchi in view of Takahashi and in further view of Isshiki (US 2001/0033312 A1).

Applicant respectfully submits that the present application is allowable over the cited art, for at least the reason that the cited art fails to disclose or suggest the aspects of the present application of a nozzle configured to discharge a liquid drop by using a piezoelectric element that is a stacked layer type piezoelectric element wherein a plurality of piezoelectric layers and a plurality of inside electrode layers are reciprocally stacked, and the piezoelectric layer is formed by a piezoelectric material not including lead but having bismuth sodium titanate as main ingredients, the piezoelectric material having a sintering temperature less than 1200 °C.

Eguchi, as understood by applicant, proposes an ink jet printer head having a stacked type piezoelectric element, and does **NOT** disclose or suggest a piezoelectric layer formed by a piezoelectric material not including lead but having bismuth sodium titanate, as main ingredients, the piezoelectric material having a sintering temperature less than 1200 °C.

Takahashi, as understood by applicant, proposes a piezoelectric film type vibrator sensor for use in devices such as microphones, viscosity sensors, load cells, and accelerometers.

Kiyoshi YAMAGUCHI et al., S.N. 10/555,041
Page 8

Dkt. 2271/75406

Takahashi proposes a construction of a piezoelectric film formed by only one layer of piezoelectric material. Takahashi proposes electrodes on either side of the piezoelectric layer which may or may not be bonded to the piezoelectric material using a heat treatment (sintering) process. Takahashi proposes the use of bismuth sodium titanate as the piezoelectric material when the electrodes are made of platinum or its alloys.

Takahashi does **NOT** disclose or suggest, however, that bismuth sodium titanate can be used to enable the use of low cost metals for the electrodes in between layers of piezoelectric material in a stacked type piezoelectric element.

Moreover, Takahashi does not involve a nozzle in a liquid drop discharge head. Instead, Takahashi, as mentioned above, is directed to a piezoelectric film type vibrator sensor for use in devices such as microphones, viscosity sensors, load cells, and accelerometers.

One skilled in the art would **NOT** have looked to Takahashi for materials or elements thereof to be used in a liquid drop discharge head.

Takahashi is concerned with enhancing the reliability and precision of piezoelectric film type vibrator sensors. One of ordinary skill in the art would **NOT** be motivated to look to such subject matter (that is, a piezoelectric film type vibrator sensor as proposed in Takahashi for use in devices such as microphones, viscosity sensors, load cells, and accelerometers) for suggestions on how to implement low sintering temperature, lead free, piezoelectric materials for use in a liquid drop discharge head.

Additionally, Takahashi does **NOT** provide any teaching or suggestion to incorporate into a liquid drop discharge head a ceramic mainly comprised of bismuth sodium titanate that is sintered at a temperature of less than 1200 degrees Celsius.

Generally, a sintering temperature of a lead-free piezoelectric element is high (above

Kiyoshi YAMAGUCHI et al., S.N. 10/555,041
Page 9

Dkt. 2271/75406

1200 degrees Celsius). Therefore, Takahashi does not suggest the desirability of incorporating a ceramic mainly comprised of bismuth sodium titanate that is sintered at a temperature of 1200 degrees Celsius or less into a liquid drop discharge head such as proposed in Eguchi.

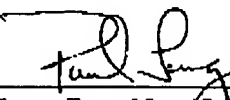
Applicant submits that the cited art, even when considered along with common sense and common knowledge, simply does *NOT* render unpatentable the aspects of the present application of a nozzle configured to discharge a liquid drop by using a piezoelectric element that is a stacked layer type piezoelectric element wherein a plurality of piezoelectric layers and a plurality of inside electrode layers are reciprocally stacked, and the piezoelectric layer is formed by a piezoelectric material not including lead but having bismuth sodium titanate as main ingredients, the piezoelectric material having a sintering temperature less than 1200 °C.

Accordingly, applicant respectfully submits that independent claims 1, 11 and 12, and the claims depending therefrom, are patentable over the cited art, and submits that the application is now in condition for allowance, and earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any required fees, and to credit any overpayment, to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



Paul Teng, Reg. No. 40,837
Attorney for Applicant
Cooper & Dunham LLP
Tel.: (212) 278-0400